

like. It is understood while several possible results are described herein, any combination of various possible results can be utilized.

**[0042]** Computer system 20 can implement an assessment process that evaluates data relating to the sensor data 38 to evaluate the validity of sensor data 38. For example, computer system 20 can acquire data indicating that one or more emitting devices has failed to operate, thereby making any sensor data 38 acquired by the corresponding sensing device invalid. In another illustrative example, asset 12 can include a chemical sensor, which utilizes an automated sampling technology with micro-fluidics, pumps, and reagents to provide sensor data 38. Computer system 20 can acquire and analyze a set of signal characteristics corresponding to the operation of the chemical sensor. Particular signal characteristics can indicate that the chemical sensor followed an erroneous process, which yields incorrect data. However, the sensor data 38 could be within physically sensible ranges for the chemical sensor and the particular application of the chemical sensor. By analyzing the signal characteristics of the chemical sensor, computer system 20 can detect the irregularity and flag the sensor data 38 as invalid.

**[0043]** In process 308, computer system 20 (e.g., control component 36A) can initiate and/or perform one or more different actions based on the evaluation result for the sensor data 38. When the evaluation indicates that the sensor data 38 is likely valid, in process 310, computer system 20 can provide the sensor data for further processing. For example, computer system 20 (e.g., application component 36D) can perform application-specific processing of the sensor data 38, which can include storing the sensor data 38, in a raw and/or processed form, for future processing and/or transmission, initiating one or more actions in response to the sensor data 38, and/or the like.

**[0044]** When computer system 20 determines that the sensor data 38 is suspect (e.g., untrustworthy, invalid, unconfirmed, and/or the like), in process 312, computer system 20 (e.g., control component 36A) can adjust one or more aspects of the operation of the asset 12. Computer system 20 can perform any combination of various adjustments based on a certainty measure that the sensor data 38 is invalid, an importance of the sensor data 38, a risk associated with an adjustment, a possible cause of the invalid data, and/or the like. For example, computer system 20 can set a flag indicating suspect data in a record storing the sensor data 38. Furthermore, computer system 20 can generate and store a record of the data quality problem as historical data 34C. The record can indicate, for example, a time the problem was detected, the sensor data 38 indicated as invalid, the quality assessment approach used to detect the problem, additional data used in the evaluation, and/or the like. Such a record can subsequently be provided to a user 14 for use in evaluating the operating condition of the asset 12 and/or for audit purposes. Similarly, computer system 20 can process a set of records of data quality problems to determine whether to initiate any further actions. For example, a particular sensing device may be known to provide sporadic invalid sensor data 38. In this case, computer system 20 can take minimal action in response to occasional receipt of invalid sensor data, but can initiate additional action when invalid sensor data is received more frequently.

**[0045]** Computer system 20 can determine whether or not a sensing device is inoperable. For example, computer system 20 can evaluate ancillary sensor data, such as data acquired

regarding one or more operating conditions (e.g., wind, movement, etc.), to determine whether the invalid sensor data 38 may have been caused by a temporary condition. If so, computer system 20 can wait until the temporary condition passes before operating the sensing device, continue operating the sensing device while monitoring all of its data, and/or the like. However, computer system 20 can fail to determine any possible external cause of the invalid sensor data 38. In this case, computer system 20 can adjust the onboard operation of the sensing device and/or one or more related devices. For example, computer system 20 can initiate a reset procedure corresponding to the sensing device and/or one or more related devices. The reset procedure can include, for example, cycling power provided to a device. Similarly, when available, the reset procedure can include computer system 20 operating an onboard cleaning mechanism to try and return a sensing device and/or one or more related devices that may be clogged/fouled to an operating condition. Additionally, a sensing device can be operated as part of an emitter/sensor pair. In this case, when sensor data 38 indicates that one of the devices is not operating, computer system 20 can shut down the other device in the pair to conserve energy, operating life of the device, and/or the like. Similarly, computer system 20 can adjust operation of other devices in response to an inoperable device, e.g., increasing a frequency with which sensor data 38 is obtained from a sensing device, initiating a failover procedure to switch to an operational sensing device of the same type, accessing data acquired by multiple other sensing devices of different types to determine (e.g., derive, calculate, estimate, and/or the like) a data value for the attribute, adjusting the type of sensor data 38 acquired from a sensing device, and/or the like.

**[0046]** Computer system 20 also can adjust one or more aspects of its interaction with a user 14, third party 16, and/or the like. For example, computer system 20 can suppress the transmission of some or all of the sensor data 38 for processing by the user 14, transmit data indicating that certain sensor data 38 is unavailable, and/or the like. In an embodiment, computer system 20 can suppress the transmission of any sensor data 38 when a threshold amount of the sensor data 38 is evaluated as being invalid. Additionally, computer system 20 can attempt to re-acquire sensor data 38 from a set of sensing devices prior to transmitting sensor data 38, an error message, and/or the like. Similarly, computer system 20 can adjust the operation of one or more local output devices that communicate information to a local third party 16, such as a radio/light beacon, or the like, to indicate an operating status of the asset 12, e.g., that asset 12 is currently unable to monitor one or more attributes of the environment, on which the third party 16 may rely.

**[0047]** In process 314, computer system 20 can adjust one or more aspects of the external management of the asset 12 in response to a determination that the sensor data 38 is suspect. For example, computer system 20 can adjust the time and/or actions for a scheduled maintenance to be performed for the asset 12. Additionally, computer system 20 can provide the invalid sensor data 38 to a maintenance system, which can evaluate the sensor data 38 and determine the required maintenance action(s) and/or timing. The time frame for the maintenance can be adjusted based on an importance of the invalid sensor data 38. To this extent, when an asset 12 is located at a fixed location, an inability to detect drift may require urgent maintenance since inadvertent drift can cause all other sensor data to be invalid despite the sensor data 38 being evaluated as